propose and dispose the courses of study; lecturers carry their behests into effect. The initiative is in the hands of the tutors who, with few exceptions, are classical, some few being mathematical, and only three scientific. By excluding scientific men from tutorships the Oxford colleges keep science at arm's length.

Three causes, then, militate against the increase of the scientific school at Oxford: the absence of any test of scientific acquirements in responsions and in most college entrance examinations, the severity of the Greek test, and the exiguous number of science tutors in colleges. These causes might easily be removed, but Oxford does not remove them, and, as a whole, it is unwilling to do so. At the bottom of it there is the wish that it should remain in the present what it has been in the past—the home of classical studies and of metaphysical philosophy. There may be those who would maintain that a university has the right to determine what courses of study should be characteristic of it. But it may be urged that the function of a university is not to be exclusive. Should it not rather be its duty to recognise and bestow its approval on the intellectual movements which have done, and are doing, most for the advancement of mankind? He would be singularly blind to what is going on around him who would deny that natural philosophy has been the great intellectual movement of this century, and that its methods and conclusions have been forced, willy-nilly, on every form of study that exists. But blindness seems to be prevalent among the majority at Oxford, or if not blindness, then wilful obstinacy. For its graduates, in their capacity as members of the University, have been obliged to give public sanction to science, and to spend large sums of money in making provision for teaching it. But in their more private capacities, as Fellows of Colleges, they stultify themselves by stopping the stream at its fountain-head. The endowments of colleges were given for the advancement of religion and sound learning. In times gone by sound learning meant Greek, and why? Because Greek literature contained not only all the metaphysical, but also all the natural philosophy known to the world. It is long since Artistotle has ceased to be the authority in natural, that he still is in metaphysical, science. But in the course of change the authorities have clung to Aristotle, and the endowments which originally were devoted to all sections of his work are now confined to only a part of them. The schoolmen, Duus Scotus amongst them, argued with as much subtlety about the scientific as about the logical teachings of Aristotle, and in so far imitated the spirit as well as the letter of the Greeks. Nowadays the letter remains, but the spirit is lost to the classicists, and has gone over, deprived of its material endowments, to science. How much longer will Oxford cling to the belief that it is the language in which they wrote, rather than the spirit in which they worked, which made the Greek philosophers the fathers of thought? It is indeed a curious satire on a modern classical education that the very things in which the Greeks were most interested are those which the Greek student of to-day most disparages.

It is to be hoped that Oxford will become awake to the unreasonable attitude which it has adopted towards natural science, unreasonable alike from the point of view of modern requirements and of the purposes of the philosophers whom it professes to venerate. For its own sake it is to be hoped that the awakening will come from within; if it does not, it will assuredly come from without. The University has just had a reminder of the dissatisfaction which was felt with the place assigned to science in its local examinations, and it has made haste to repair the defect. The dissatisfaction with its external examinations is as nothing compared with the growing dissatisfaction with its internal system, which, if left unremedied, must prejudice its reputation and destroy the influence which it possesses in the intellectual world.

Let it be said, in conclusion, that there are many at Oxford who are classical to the core, yet would willingly do all that is required for the advancement of natural science. They are mostly to be found among the middle-aged, not among the younger graduates. If certain actions of classical Oxford have been condemned in what precedes, exception is of course made of the more liberal minority, whose actions, if left unfettered, would be all that the most bigoted man of science could desire.

NOTES.

WE are informed that notification of the following additional delegates to the International Conference on the Catalogue of Science has now been received at the Royal Society:—Austria: Prof. Ernst Mach, Prof. Edmund Weiss. Germany: Prof. Walther Dyck (Munich), Prof. Van 't Hoff (Berlin), Prof. Möbius (Berlin), Prof. Schwalbe (Berlin), Oberbibliothekar Wilmanns (Berlin). Norway: Dr. Jörgen Brunchorst. The list of delegates is therefore now a remarkably complete and full one.

SIR GEORGE BADEN-POWELL has completed his arrangements for taking an observing party to Novaya Zemlya to observe the forthcoming solar eclipse. He will be accompanied by Dr. Stone, of the Radcliffe Observatory, Oxford, and Mr. Shackleton, of the Solar Physics Observatory, South Kensington.

AMONG the Civil List pensions shown in a return just laid upon the table of the House of Commons, we notice a pension of £200 to Mrs. Huxley, one of £120 to Mr. James Hammond, and one of £120 to Mr. Oliver Heaviside.

PROF. VAN DE SANDE BAKHUYZEN, Professor of Astronomy in the University of Leiden, has been elected a Correspondant of the Section d'Astronomie of the Paris Academy of Sciences.

DR. SAMUEL WILKS, F.R.S,, President of the Royal College of Physicians, has been appointed one of her Majesty's Physicians Extraordinary, in the place of the late Sir George Johnson.

THE death is announced of Prof. A. G. Stoletow, Professor of Physics in the University of Moscow. Prof. Stoletow was the author of several important memoirs on magnetism and electricity, the velocity of sound, the critical state, and other physical subjects.

SIR JOHN PENDER, who was for many years prominently associated with the promotion of submarine telegraphy, died on Monday. It was largely due to his enterprise and faith in the practicability of laying a submarine wire between England and America, that the capital required to lay the Atlantic cable of 1866 was subscribed. He also took a leading part in the organisation and development of the Mediterranean, Eastern (India and China), Australian, South African, and Direct African cables. It is stated that the cable mileage of the submarine telegraph companies over which he presided at the time of his death amounts to 73,460 nautical miles.

NOTHING is safe from syndicates of speculators. From a question asked in the House of Commons on Tuesday, it appears that an attempt is being made to exclude the public from right of way to the Giants' Causeway. Unfortunately that great natural wonder is not public property, and cannot, therefore, be protected from the syndicate which proposes to interfere with the right of access to it.

THE distribution of prizes to the students of the Charing Cross Hospital Medical School will take place next Tuesday, July 14. The Hon. Mr. Justice Vaughan Williams will occupy the chair.

THE geological collection at Peel Park, Salford, which some years ago was withdrawn from public view, has been entirely rearranged, and was reopened last week. The process of rearrangement has been carried out by Mr. Herbert Bolton, of the Manchester Museum. The collection is now in a condition which will make it of service to students, and it will doubtless become an important factor in the educational progress of the borough.

A TELEGRAM from Sir Walter Sendall, High Commissioner for Cyprus, reports that incessant earthquake shocks have been felt there for several weeks, causing great alarm and interruption of business. A Reuter telegram from Larnaca, dated July 6, says: "Violent shocks of earthquake continue to be felt in the island. A general panic prevails at Limasol, and the Government and military authorities are providing tents for the people. Permission has also been given to families to take up their quarters in the commissariat huts and camp at Polymedia. The town is deserted, and the Government offices, the bank, and the telegraph office have been installed under canvas."

MR. JOHN MILNE writes us, that between June 23 and 31 he recorded several earth disturbances, which from their character had apparently originated at great distances. One commencing at 9h. 2m. 35s. G.M.T., on June 29, is probably identical with the earthquakes which on that evening shook Cyprus. With regard to the records of Prof. Vicentini of Padua, which in Japan mean time occurred at about 8.30 p.m. on June 15, and 5 and 9 a.m. on the following morning, he remarks that he only recorded the former of these on the 16th—his instrument being dismantled for adjustments to correspond with those of a second instrument which that day was installed at Carisbrooke Castle. Certain telegrams tell us that the sea waves on the coast of Japan took place on June 17; but this information, which, it will be observed, does not accord with what was noted in Europe, has not yet been confirmed.

THE highly poisonous nature of acetylene has suggested to M. Chuard the possibility of employing carbide of calcium as an insecticide for agricultural purposes. M. Chuard proposes to try thoroughly mixing the carbide with earth, so that under the influence of moisture acetylene would be slowly given off at the roots of plants, thus preserving them from attack. At the same time, the bye-products, consisting of chalk and a little ammonia, would have a beneficial effect on the soil. It is proposed to try this method against phylloxera. Whether this would succeed equally well in all weathers, wet or dry, is quite another question.

IN the *Annales de micrographie*, M. Miquel gives statistics for ten years of the numbers of bacteria in a cubic metre of air, both in the centre of Paris and in the park of Montsouris. In consequence of local improvements, the air in the park has gradually become purer, the number of bacteria having decreased from 480 per cubic metre in 1884 to 275 in 1893; but the air in Paris itself has increased in micro-organisms from 3480 in 1884 to 6040 in 1893. This large increase M. Miquel attributes to the greater cleanliness of the inhabitants, who, by dusting out and cleaning their houses and shaking carpets, &c., stir a large quantity of germs into the air. He even goes so far as to condemn this form of cleanliness on the ground that the germs are simply blown about by the wind, and find their way into the houses again, so that if you do not get your own germs back, those from your neighbours fly in at the window instead.

IT is nearly ten years ago that Dr. Carl Auer von Welsbach first enunciated the property of rare earths, which led to his discovery of the incandescent light. In a contribution to the *Atti della R. Accademia dei Lincei*, Signor Enrico Clerici now considers the action which takes place when vegetable tissues are soaked with solutions of certain salts, such as are used in the preparation of incandescent mantles, and the organic matter is afterwards removed by calcination. It appears that if sections of wood are treated in this manner with nitrates of certain metals, and the ashes are examined under the microscope, every detail of the original tissues is found perfectly preserved, even down, for example, to the scalariform ducts of *Pteris aquilina*. The author compares this process with the petrifaction of fossil woods, and he concludes that we have here a phenomenon of molecular interposition with which it is possible to cause certain insoluble and refractory oxides to penetrate into cell-walls and vegetable fibres, and to transform them in the course of a few minutes into true petrifactions.

THE anxiety of German municipal authorities to attract men of science to their cities and retain them there, is exemplified by a note in the current number of the *Lancet*. It may be remembered that in 1890, when Prof. Koch made his announcement respecting tuberculin, a special institution was founded by Parliament, under the name of the Royal Institution for Infectious Diseases, in order that he might be enabled to continue his researches on the treatment of such diseases on a larger scale than before, and it was placed entirely at his disposal instead of being controlled by the university, like all the other scientific institutions. It was, in fact, a special hospital in which new methods of treatment were to be tested, and it also contained a large laboratory, provided with every requisite, where not only Prof. Koch and his staff, but a number of other medical men carried on scientific work. The Government having lately announced that the Institution would possibly be removed from Berlin, the town council of Frankfurt offered to provide Prof. Koch with ample laboratory and hospital accommodation if he would agree to settle in their city. But when these negotiations became known, the medical as well as the lay press urged the Government to take measures to retain this important establishment in the metropolis, and an arrangement has now been made according to which the Institution is to be attached to the new Berlin Municipal Hospital at present in course of construction. The laboratory department will be built and furnished by the State, whilst the wards for infectious diseases belonging to the hospital are to be placed at the disposal of Prof. Koch by the municipal authority. This arrangement was strongly supported by Prof. Virchow, who is a town councillor, and it will, says our contemporary, undoubtedly have the approval of the medical men of Berlin, anxious as they are not to lose so celebrated an investigator as Prof. Koch. The spectacle of the London County Council holding out advantages to a man of science in order to dissuade him from migrating to another city awaiting to receive him with acclamation, is one which we are unable to imagine.

LAST autumn a mysterious disease appeared amongst the poultry-yards in Rome, and was of so virulent a type that it produced a mortality of about 60 per cent. amongst the fowls which it attacked. Careful investigations could not identify it with the fowl-cholera of Perroncito and Pasteur, or with the cholera of ducks described by Cornil, or indeed with any other of the diseases hitherto bacteriologically associated with feathered animals. Dr. Salverio Santori, of the Laboratorio medico-micrografico del Comune di Roma, has recently published in an Italian hygienic journal the investigations which he has carried out as to the nature and origin of this epidemic. His results are extremely interesting, for he has succeeded in isolating, not only a new pathogenic micro-organism, but one which belongs to the class of pigment-producing bacteria, the latter being but rarely associated with disease. In consequence of the splendid red colour it elaborates in artificial culture media, he has called it *Eritro-batterio.* In its microscopic appearance, and indeed in many other respects, it resembles the well-known *B. prodigiosus*, but it differs from the latter in its extreme virulence when subcutaneously inoculated in very small quantities into white rats, guinea-pigs, rabbits and fowls, death ensuing in from twelve to eighteen hours when liquefied gelatine-cultures are employed. When introduced *per os*, death is postponed for sometimes two months; but during the last ten or twenty days of the animal's existence, its extremities are completely paralysed. In both cases the microbe is found in the blood and all the organs of the body, but more especially in the fluids of the peritoneal cavity. It fails to elaborate its pigment in the absence of air, or when exposed to a temperature of 37·5° C., although it grows abundantly, and its virulence is not in the least diminished. Its pathogenic properties rapidly disappear in artificial cultures, often after a week; and the best method of preserving its virulence was found to be soaking silk threads in cultures, and letting them dry. Under these conditions, its virulence was preserved for three or four months. No immunity was induced in animals by administering gradually increasing doses of the toxine elaborated by it in broth. When exposed to the direct rays of the sun, in drops of broth enclosed in a Petri dish, it was destroyed in from eleven to thirteen hours.

"LEFT-HANDEDNESS in North American Aboriginal Art" is the subject of a short essay, by Dr. D. G. Brinton, in the May number of *The American Anthropologist.* He finds that a preference for the right hand and side has existed in the majority of mankind from earliest times, though not always in the same degree, and concludes that the ultimate reason for it is to be found in the erect posture of man. "The Anthropoids and other primates closest to men are ambidextrous, displaying no preference for either hand. But the erect posture introduces a new distribution of force in the economy; it opposes the powerful retardation of gravity to the distribution of the arterial blood above the level of the heart. The great arteries arising from the aorta carry the blood in an appreciably shorter course, and in less time, to the left brain than to the right. Its nutrition, therefore, is the more abundant, and its vitality the more active of the two hemispheres. Hence the right side of the body, which it controls, is more ready to respond to a stimulus on account of its higher innervation." There is also a short note on this subject, by O. T. Mason, in the June number of the same journal.

PROF. FRANK N. CUSHING'S expedition to explore the neighbourhood of Pine Island, of which mention was made in NATURE several months ago, proved extremely successful. Prof. Cushing has just returned laden with rare and interesting archæological specimens, and bringing the story of discoveries which demonstrate the existence of a prehistoric people in South-western Florida and the neighbourhood, who have left a multitude of mounds and other structures of couch shells, and whose works seem to furnish the key to much that was inexplicable in American archæology. He says that this ancient people differed in many ways from any others hitherto known; but that they somewhat resembled the Swiss lake-dwellers in their mode of life, and that their state of culture was quite similar and equal to that of the mound-builders and the Mayas and other builders of the ruined cities of Yucatan and Central America. Innumerable islands were found covered with shell foundations, and some with structures covering hundreds of acres, and rising fifty to sixty feet above the sea. A low mound, sixty feet in diameter, near Tarpon Springs, was thoroughly explored; more than six hundred skeletons were found, besides a large quantity of pottery, stone and other objects of art. At Marco, near the southern end of the Florida Peninsula, extraordinary painted tablets were found; also many carved wooden vessels, and implements and utensils of shell and bone. Sections of the shell islands made below the gulf level showed them to be entirely artificial, and the result of slow and long-continued building. The civilisation developed on these islands is supposed to have extended southward to Yucatan, and northward to the abode of the mound-builders. A notable collection of masks was found, put away in sets, each with an appropriate animal figure-head, designed for use by priests performing the myth drama. The shell structures of the Ten Thousand Islands, as well as those on the mainland, are covered with peat and dense growths of mangrove, cactus and other tropical vegetation. The general plan is similar in all. There is a network of enclosures of various sizes, or ridges leading up to terraces crowned by gigantic mounds. A series of level-topped pyramids surround two or three lakes, from which channels lead out to the sea. The resemblance to the ancient cities of Yucatan is striking and instructive. The explorations made lead to the inference that the Ten Thousand Islands are nearly all artificial.

THE publication of the *Annals* of the Russian Central Physical Observatory for the year 1893 has enabled Dr. Hann to collate the mean temperature conditions of Verchoyansk, in Russian Siberia, from observations extending from nine to eleven years. The position of this place, which from the extraordinary lowness of the winter temperatures has become classical from a climatic point of view, is 67° 34′ N. lat. and 133° 51′ E. long. We extract the following remarkable records from the *Meteorologische Zeitschrift* for June. The figures refer to the lowest monthly means, and the absolute minima, respectively: November −47°·6, −72°·4; December −63°·0, −82°·8; January −71°·1, −90°·0; February −72°·0, −93°·6; March −43°·2, −77°·4. The extraordinary minimum for February has been quoted previously; it occurred in 1892, and is supposed to be the lowest reading recorded in any part of the globe. The mean yearly temperature, corrected for diurnal range, from values calculated by Dr. H. Wild, is 1°·0 F.

AT the meeting of the French Meteorological Society on the 2nd ult., M. Angot communicated a summary of five years' observations on the velocity of the wind at the top of the Eiffel Tower and at the Central Meteorological Office. These observations fully confirm results previously obtained, and show that the diurnal variation of the wind on the tower is quite different from that observed near the ground. The velocity is nearly constant during the night, slackens during the early morning, and reaches its minimum in the afternoon. Near the ground, on the contrary, it is known that it freshens soon after sunrise until early in the afternoon, and then decreases regularly during the night. These results show that this variation is only a phenomenon peculiar to the lowest strata of the atmosphere. It is interesting to note that it is only necessary to ascend about 1000 feet to meet with the conditions known to exist on mountains, viz. maximum and constant velocity during the night, and decrease of velocity during the day, under the influence of the vertical motion of the air due to the heating of the soil.

WE are glad to call attention to the publication of Part iv. (vol. iv.) of the *Transactions* of the Leicester Literary and Philosophical Society. Among the contents we notice: "Notes on the Swiss Flora," by Mr. G. C. Turner; "Note on a Dermoid Tumour from a Frog," by Mr. F. R. Rowley; and "A Comparison between the Lepidoptera of Japan and Great Britain," by Mr. W. J. Kaye.

FOUR new volumes have appeared in the Encyclopédie scientifique des Aide-Mémoire series. In one of these—"La Spectroscopie"—Prof. Julien Lefèvre briefly describes the application of spectrum analysis to physics, chemistry, physiology, and astronomy. The different methods employed for the observation of emission and absorption spectra in the laboratory, the solar spectrum, and the constitution of radial movements of stars are described, and a chapter is devoted to phosphorescence and fluorescence. The study of prisms, spectroscopes, and the theoretical side of the subject is treated in a companion volume—"Spectrométrie-Appareils et Mesures"—in the same series. A third volume recently received is entitled "Attaque des Places," by Lieut.-Colonel E. Hennebert. In it the various methods of besieged and besiegers, in past and present times, are set forth for the instruction of military engineers. MM. H. Moissan and L. Ouvrard have contributed to the series a valuable little volume on nickel—"Le Nickel." They describe in succession the physical and chemical properties of nickel, the principal compounds, minerals containing nickel, the metallurgy of nickel, alloys, extraction of nickel by electrolysis, and the principal applications of the metal.

THE additions to the Zoological Society's Gardens during the past week include two White-tailed Deer (*Cariacus leucurus*, ♂ ♀) from Canada, presented by Mr. Richard R. Dobell; a Red-bellied Squirrel (*Sciurus variegata*) from Vera Cruz, presented by Mrs. G. Maria Pullen; a Blue-fronted Amazon (*Chrysotis æstiva*) from South America, presented by Mr. A. E. Corsbie; a Black-headed Gull (*Lorus ridibundus*), European, presented by Mr. James Boorne; a Peregrine Falcon (*Falco peregrinus*), caught off the coast of Terra del Fuego, presented by Mr. T. W. Hubble; two Spotted Salamanders (*Salamandra maculosa*), European, presented by Mr. Philip Gosse; a Chimpanzee (*Anthropopithecus troglodytes*), a Temminck's Pangolin (*Manis temminckii*) from West Africa, two Ostriches (*Struthio camelus*, ♂ ♀) from Africa, a Blood-breasted Pigeon (*Phlogœnas cruentata*) from the Philippine Islands, two Hamadryads (*Ophiophagus elaps*), two Indian Pythons (*Python molurus*) from India, three Naked-necked Iguanas (*Iguana delicatissima*) from Tropical America, a Great-billed Rhea (*Rhea macrorhyncha*) from Brazil, deposited; a Crested Pigeon (*Ocyphaps lophotes*) from Australia, purchased.

OUR ASTRONOMICAL COLUMN.

BROOKS'S PERIODIC COMET.—The following search ephemeris for this interesting comet is from a complete one in *Astr. Nach.*, 3361:—

1896.	App. R.A. h. m. s.	App. decl. ° ′ ″	Brightness.
July 11	22 37 59·13	18 8 51·3	1·06
15	39 0·64	18 9 52·8	1·14
19	39 35·58	18 12 28·2	1·22
23	39 43·58	18 16 28·1	1·31
27	39 24·50	18 21 40·9	1·40
31	22 38 38·45	−18 27 52·2	1·50

Following the above table, the comet should be looked for soon after midnight about 11° north of the 1st mag. star Fomalhaut, which is on the meridian about 3.30 a.m.

MAGNITUDES OF SOUTHERN STARS.—In vol. xxxiv. of the *Annals of the Astronomical Observatory of Harvard College*, a complete and graphic description is given of the expedition sent out from the observatory at Cambridge, Mass., to South America, in order to extend the work of the Harvard Photometry to the stars of the southern hemisphere. Mr. S. I. Bailey, assistant professor of astronomy at the College, was the observer chosen for this duty, and in the report gives an historical account of his journey southward, which began on February 2, 1889, his only companions being his wife and son. Guided partly by the information furnished by the inhabitants respecting the meteorological conditions of the country, he at last decided to erect a station in Peru, choosing a spot on the summit of a mountain 6600 feet above sea-level, about eight miles north of east from the Chosica station of the Oroya railway. The observations have all been taken with the meridian photometer used for the northern stars, described in vol. xxiv. of the *Annals*. The instrument has two objectives, each of 10·5 cm. aperture and 166 and 145 cm. focal length respectively. Magnifying powers of twenty-eight and twenty-four diameters were used in the measurements. The magnitudes have been obtained by comparing each star separately with σ Octantis, mag. 5·5, this being the brightest star in the neighbourhood of the south pole. The first series of observations were taken on May 24, 1889, and for several months after this the weather proved very favourable, the instrument being used on nearly every clear night. As the summer season of the southern hemisphere approached, clouds became more frequent, and at length almost every evening was cloudy. This being so, the instrument was dismounted, and the observers travelled further southwards, remounting the photometer at a mining village called Pampa Central, near Valparaiso. In March 1890, they returned to Chosica, and again mounted the instrument in its old position, but the weather not proving so suitable as in the previous year, they again removed in September, and set up the station at Arequipa. Thus the measures of the various stars have been made at four stations. Following this introductory description, comes the voluminous catalogue of the magnitudes of 7922 southern stars, arranged on the same plan as the Harvard Photometry for the northern hemisphere.

RUGBY OBSERVATORY.—From the report of the Temple Observatory, Rugby, we learn that double-star observations were continued during last year. These observations are in continuation of the series commenced by Messrs. Wilson and Seabroke in 1871, which now comprises about 5000 complete measures of distance and position angle. The measures have been regularly published. The working list of double stars, which forms part of the report, gives approximate positions and measures for purpose of identification, and will be very useful to other observers who are following the same line of research. The observatory was open on eighty-three nights for the instruction of members of the school.

HARVARD COLLEGE OBSERVATORY.—Prof. Pickering has made the issue of the fifteenth annual report the occasion for furnishing some interesting particulars as to the establishment of Harvard College Observatory, and stating the general policy of the management. One of the statutes states that "the objects of the observatory are to furnish accurate and systematic observations of the heavenly bodies for the advancement of astronomical science, to co-operate in geodetical and nautical surveys, in meteorological and magnetical investigations, to contribute to the improvement of tables useful in navigation, and, in general, to promote the progress of knowledge in astronomy and the kindred sciences." It is noteworthy that no reference is made in the statutes to teaching, and the observatory is therefore primarily an institution of research, although such teaching as does not interfere with the regular work has been undertaken. While precise measures of position have not been neglected, the policy has always been to specially study the physical properties of the stars and other heavenly bodies, since less attention is usually paid to such work than to meridian work in most observatories. Accordingly much attention is given to photography, photometry and spectroscopy. Details as to the manner in which the various instruments have been employed are also given. The revision of the stars in the Harvard Photometry has been completed and is ready for publication, and it is worth noting that as many as 322 stars were observed on one occasion in the space of six hours, roughly one a minute; 107 photographs of the spectrum of β Lyræ have been lent to Prof. Frost for investigation. and this has suggested the possibility of increasing the usefulness of all the photographs which have been taken. Prof. Pickering invites correspondence with astronomers who may desire to borrow any of the photographs, and suggests the investigation of positions, distribution and brightness of stars in clusters, distribution of light in spectra, peculiar spectra, eclipses of Jupiter's satellites, and lunar mountains.